

WHAT IS CLAIMED IS:

1. An image processing apparatus for outputting image data for displaying a desired 3D-shape composed of a plurality of polygons, comprising:

storage means for storing vector data defining a  
5 regular polyhedron which has a centroid at an arbitrary point in  
a space and each of whose faces is divided into a plurality of  
polygons and representing directions from the centroid toward  
vertices of the plurality of polygons, and for storing distance  
data for setting distances between the centroid and the vertices  
10 of the plurality of polygons of the desired 3D-shape,

reading means for reading the vector data and the  
distance data from the storage means, and

image data outputting means for outputting image data  
for displaying an image of the desired 3D-shape such that the  
15 vertices of the plurality of polygons of the desired 3D-shape are  
points which are, from the centroid, at distances based on the  
distance data and in directions based on the vector data read from  
the reading means.

2. The image processing apparatus according to claim 1,  
wherein the plurality of polygons into which each face  
of the regular polyhedron is divided have the same size and shape.

3. The image processing apparatus according to claim 1,  
wherein the regular polyhedron is a regular octahedron.

4. The image processing apparatus according to claim 1,  
further comprising contact determination means for  
making, based on a distance of another object from the centroid  
and a distance from the centroid of a polygon to be subjected to  
5 contact processing on the desired 3D-shape, a contact  
determination between the desired 3D-shape and the other object.

5. A program to be executed by a computer which is, for  
outputting image data for displaying a desired 3D-shape composed  
of a plurality of polygons, capable of reading data from storage  
means for storing vector data defining a regular polyhedron which  
5 has a centroid at an arbitrary point in a space and each of whose  
faces is divided into a plurality of polygons and representing  
directions from the centroid toward vertices of the plurality of  
polygons, and for storing distance data for setting distances  
between the centroid and the vertices of the plurality of polygons  
10 of the desired 3D-shape, comprising:

a step of reading the vector data and the distance data  
from the storage means, and

a step of outputting image data for displaying an image  
of the desired 3D-shape such that the vertices of the plurality  
15 of polygons of the desired 3D-shape are points which are, from

the centroid, at distances based on the distance data read and in directions based on the vector data read.

6. The program according to claim 5,

wherein the plurality of polygons into which each face of the regular polyhedron is divided have the same size and shape.

7. The program according to claim 5,

wherein the regular polyhedron is a regular octahedron.

8. The program according to claim 5,

further comprising a step of making, based on a distance of another object from the centroid and a distance from the centroid of a polygon to be subjected to contact processing on  
5 the desired 3D-shape, a contact determination between the desired 3D-shape and the other object.

9. The program according to claim 8,

wherein the step of making a contact determination comprises:

a step of selecting, based on signs of space  
5 coordinate values of the other object, a face area of the regular polyhedron which includes a polygon to be subjected to contact processing,

a step of identifying the polygon to be subjected

to contact processing from within the selected face area, by using  
10 a plane equation obtained from the distance data, and

a step of determining contact between the other  
object and the desired 3D-shape by comparing a distance of the  
identified polygon from the centroid and a distance of the other  
object from the centroid.

10. A recording medium for recording a program to be  
executed by a computer for displaying a desired 3D-shape composed  
of a plurality of polygons, and data, wherein the recording medium  
has recorded thereon:

5 vector data defining a regular polyhedron which has a  
centroid at an arbitrary point in a space and each of whose faces  
is divided into a plurality of polygons and representing  
directions from the centroid toward vertices of the plurality of  
polygons,

10 distance data for setting distances between the  
centroid and the vertices of the plurality of polygons of the  
desired 3D-shape,

a program for reading the vector data and the distance  
data from the storage means, and

15 a program for outputting image data for displaying an  
image of the desired 3D-shape such that the vertices of the  
plurality of polygons of the desired 3D-shape are points which  
are, from the centroid, at distances based on the distance data

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